

**MAT 3221 Engineering Mathematics 4–Set 2**

1. Evaluate the following integral

$$\int_0^4 (1 - e^{-2x}) dx$$

- (a) analytically,
  - (b) single application of the trapezoidal rule,
  - (c) single application of Simpson's 1/3 rule,
  - (d) For each of the numerical estimates, determine the percent relative error based on (a).
2. Use Euler's method to find an approximate solution to

$$\begin{aligned} y' &= y - t^2 + 1, & 0 \leq t \leq 2, \\ y(0) &= 0.5 \end{aligned}$$

with  $h = 0.2$ .

3. Use Taylor's method of order 2 and 4 to problem (2).
4. Apply the Runge–Kutta method of order 2 to the problem (2).